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HEALTH BULLETIN No. 11

# INSECTS AND DISEASE



GOVERNMENT OF THE PHILIPPINE ISLANDS  
DEPARTMENT OF THE INTERIOR

*Bureau of Public Health*



HEALTH BULLETIN No. 11

# INSECTS AND DISEASE



GOVERNMENT OF THE PHILIPPINE ISLANDS  
DEPARTMENT OF THE INTERIOR

MANILA  
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## **Flies Breed in Manure and Garbage**

**THEY CARRY**  
**Cholera**  
**Dysentery**  
**Typhoid Fever**  
**Tuberculosis**  
**Pus-infections**

**Therefore**  
**bury or burn the**  
**material in which**  
**they breed**

**Screen your food**

BUREAU OF HEALTH FOR THE PHILIPPINE ISLANDS  
**HOW FLIES ARE MADE**

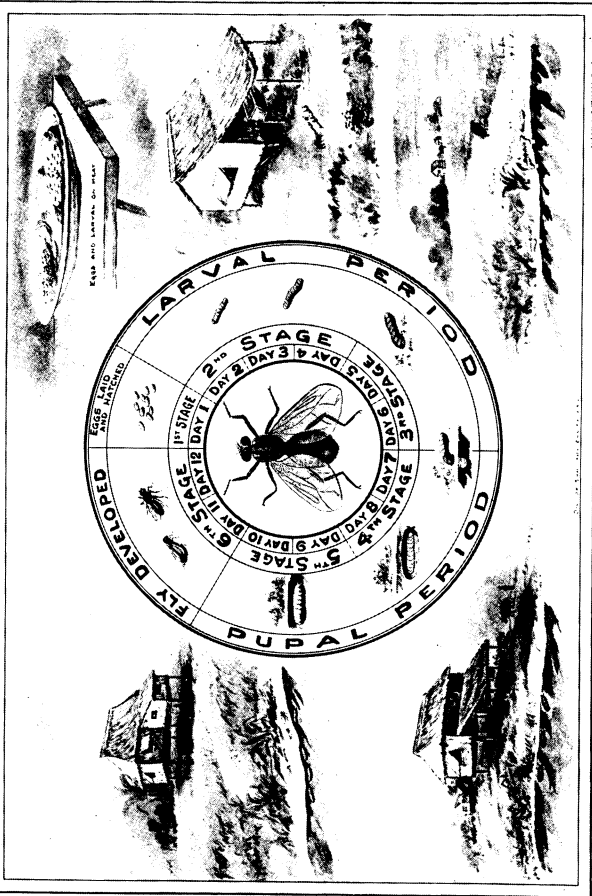


PLATE I.



# THE FLY MENACE.

(PLATE I.)

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Flies are often carriers of diseases, especially of cholera, dysentery, and typhoid fever. The part of the common house fly in the spread of typhoid fever is so great that among medical men it is known as the "typhoid fly."

## THE HABITS OF THE HOUSE FLY AND HOW AND WHY IT SPREADS DISEASE.

Where they breed.—All flies are filthy. They breed in filth. Their favorite food is sputum, excrement, decaying flesh, and garbage. From these filthy materials they will go directly and light upon food to be eaten by human beings, carrying with them on all parts of their bodies the germs collected from these dangerous and disgusting sources.

How they breed.—Flies lay their eggs in decaying animal or vegetable matter like manure or other excrement. The egg develops into the larva, a wormlike creature, commonly known as a maggot, which at the end of about five days crawls into the ground and assumes a quiescent state and becomes a pupa. It remains as a pupa four or five days, when it emerges as a full-fledged fly ready to begin its mission of filth extension.

What they eat.—An indictment against flies would not be complete unless it charged them with eating manure and sputum. They like open closets much better than they do water-closets, because they can obtain their food from such closets without much effort.

How they spread disease.—The fly on leaving the sources of filth that have been mentioned or any other filthy sources, for any kind of filth is attractive to the fly, will light upon the food that you, or perhaps your children, are going to eat. They may leave the privy or a deposit of sputum and crawl upon your lips while you are taking a siesta, or perhaps accidentally fall in your tea or coffee, which, if it is not too warm to be partaken of, will not kill the germs which are washed off from the fly's body. The drinking of tea or coffee or

other liquids in which a fly has fallen is the same as eating fly soup. Yes, even worse than this, because there are some things on the fly's body that are worse than the fly itself. These are the filth-derived germs which are washed off the body of the fly when it falls into liquids and which produce disease when taken into the alimentary canal.

Flies deposit specks over all the articles in your rooms. These specks, which are really the waste matter thrown off by the fly, may contain the germs of tuberculosis or of typhoid fever or of cholera or of dysentery, according to the nature of the filthy food of which they have partaken.

It will thus be seen that flies are a constant menace to health, a danger to life, and an enemy to happiness. If you believe in protecting your own health or the health of your family or of your friends, you should enlist in the warfare against flies and destroy them by every possible means, whether as described in circulars or books or as devised by yourself.

#### **HOW WE CAN PROTECT OURSELVES AGAINST FLIES.**

**Keep food screened against flies.**—As it is very difficult to kill all the flies, it becomes necessary to protect ourselves against them. This can be done by protecting foodstuffs from contamination. Food that decays easily should be kept in refrigerators and other food may be kept in properly screened food safes or boxes covered with wire netting.

**Properly dispose of human excrement.**—The germs which cause typhoid fever, cholera, and dysentery are found in the discharges from persons suffering from these diseases; therefore when flies breed in or feed on discharges from the intestinal tract of a person suffering from typhoid fever, cholera, or dysentery, they take from such discharges and carry with them the organisms or germs which cause the disease. They then deposit these germs on any food intended for human consumption upon which they may alight. It is therefore very evident that all fecal discharges should be protected against flies until they can be disposed of by burying in the ground. They should be buried far from any source of water supply, in a hole at least 3 feet deep under a cover of well-packed earth.

**When and how to disinfect feces before burying.**—When feces are known to have come from a case of cholera, typhoid fever, or dysentery, they should be thoroughly disinfected before they are buried. By the disinfection of fecal matter is meant that it shall be well mixed with three times its bulk of a solution of 5 parts of carbolic acid to 95 parts of water or 3 parts of kreso or kreolin to 97 parts of water or a 1 to 1,000 solution of bichloride of mercury. The disinfectant and the stool should remain in contact for at least one-half hour. In the case of bichloride of mercury an excess of the disinfectant should be used, as much of it is rendered inert by coagulating with the albuminous material of the stools.

There is no better way to dispose of such stools than by burning them. When no disinfectants are to be had and it is not convenient to burn the stools, they should be disinfected with boiling water before they are buried.

**Feces disposal in the provinces.**—Whenever possible, it is best to dispose of human excreta by the means of modern plumbing and have it carried away by an approved sewer or discharged into a septic tank, but where such means are not available, others, though less desirable, must be substituted. The Bureau of Health has devised a pail closet which is very inexpensive even in the most isolated places. The details of its construction are shown in Plate II. The frame is made preferably of hard wood and consists of four posts, set into a well-mortised frame. The posts are made of such height that when the seat is placed upon them, an ordinary 5-gallon kerosene can may be slipped into the side of the frame and be close enough to the bottom of the seat to prevent the entrance of flies. The post at the back of the frame comes through so that it may serve as a handle by which the closet may be moved from place to place and it also serves the purpose of making the lid self-closing. The can rests upon two cross strips, by which the close fit of the top of the can to the under side of the seat can be readily secured by either planing down the cross pieces when the can fits too tight or replacing them with thicker ones when it fits too loosely. By this simple expedient the fit

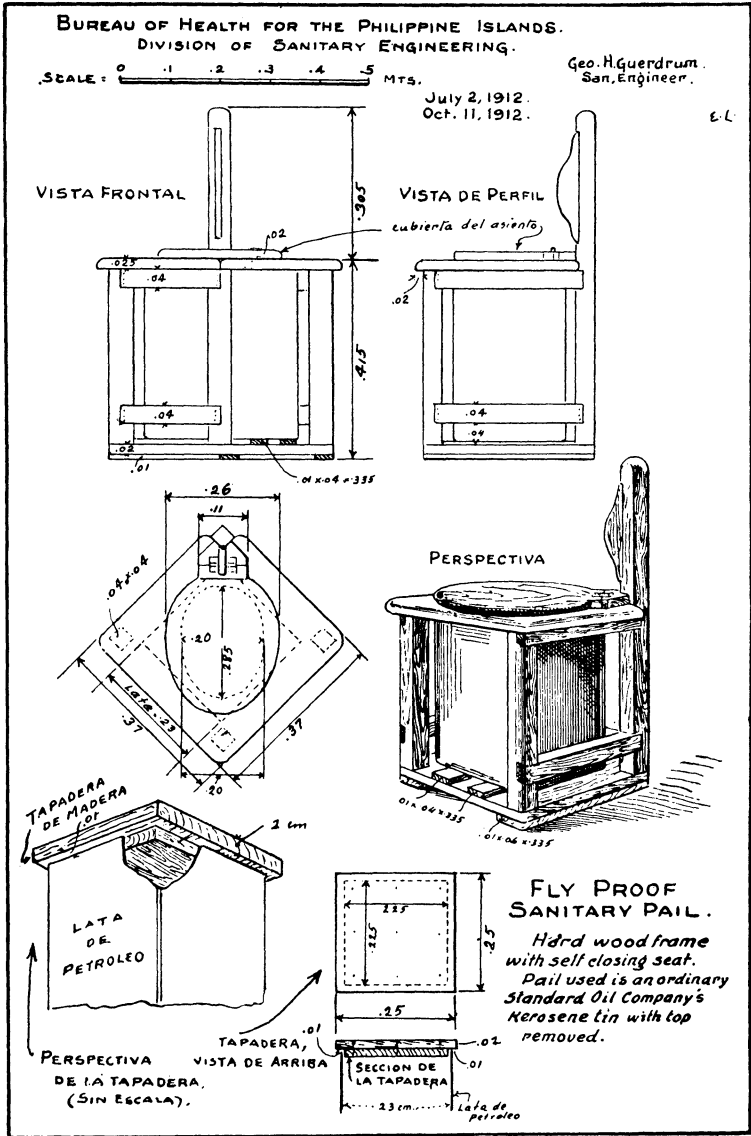


PLATE II.

of the can need not be dependent upon absolutely accurate workmanship on the frame. The hole in the seat is cut diagonally because it makes the use of the closet more comfortable because the feet can be put back. The hole is covered with a hinged seat which is made self-closing by the projection which is put on the post which comes through the seat.

The closet has the advantage of being entirely open, which fact secures good ventilation and leaves no opportunity for the collection and retention of disagreeable odors which are so common in the box-like designs heretofore used. The entire frame can be readily cleansed. It is light, easily moved about, and where there is nothing better available it serves the purposes of a commode for a sick room.

On account of the light weight of the can as compared to the wooden pail, it is a much more simple matter to provide for an inexpensive daily collection system. The ordinary carabao or bull cart found in the provinces is admirably adapted for this service and can haul many more cans than it could pails, so that the cost can be kept down to a point which makes it possible to use a suitably located central pit into which the contents of the cans may be dumped and which can be placed in charge of an attendant.

When each householder is allowed to have his own pit, the cost of the amount of inspection required to keep them from becoming nuisances is generally beyond the means of any ordinary municipality to defray.

The cans should be collected, then, every night and replaced with a clean one.

The closet also has the advantage of being complete in itself. For the regulation pail it is necessary to construct a fly-proof inclosure or house, and experience with these shows that it is most difficult to maintain them in a fly-proof condition.

**Properly dispose of garbage.**—Garbage should be kept in galvanized-iron cans with tight-fitting covers. These cans should be placed every night wherever the municipal ordinance may designate that they shall be placed, so that the contents may be collected and disposed of in a sanitary manner. In provincial towns where there is no city gar-

bage-collecting system, householders should burn their garbage or bury it in the ground and cover it with earth well packed so that it cannot be uncovered by dogs.

**Properly dispose of manure.**—If the owners of stables would see to it that they are kept clean and that all manure is placed in a tight receptacle as soon after it is deposited as practicable, the flies would have no chance to breed, as their principal breeding place is in stable manure. It should be collected at least weekly, then burned or buried in a pit, not less than 3 feet deep and well covered with earth. The practice of using manure as a fertilizer without proper chemical treatment is to be condemned, because if there is any possible way for the flies to get into it and deposit their eggs they will do so.

**How the adult flies in your house may be killed.**—To get rid of the adult flies that have entered your house, prepare the following poison: To a pint of water add a little milk and sugar to sweeten, then two teaspoonfuls of formalin. This should be put in a dish and placed where the flies are most numerous. A piece of bread upon which the flies can alight may be placed in the middle of the dish.

### WHY YOU SHOULD JOIN THE "SWAT THE FLY" SOCIETY

**The warfare against flies.**—In the United States there have been formed what are known as "Swat the Fly" societies. This simply means societies whose object is to protect the public and private health by the destruction of flies. Every person who is old enough to understand the matter should take an interest in this crusade against flies and endeavor to keep his own home free from these dangerous insects and to prevent them from finding a breeding place on the premises. Young children should be taught the danger of contact with flies and instructed to look upon them as enemies that are seeking their lives. Such co-operation on the part of the people will eradicate one of the principal factors in the spread of gastro-intestinal diseases, and not only bring protection to individual families but insure a greater measure of health and happiness for all the people throughout the land.

## OTHER DISEASE-CARRYING FLIES.

Besides the house fly there are other flies which are instrumental in carrying disease. These, such as the stable fly, the horse fly, the sand fly, and the tsetse fly, are all biting flies and suck the blood of their host.

In Africa there is a disease known as sleeping sickness which is transmitted through the bite of the tsetse fly. The tsetse fly also carries surra in certain parts of the world, but surra is an animal disease and does not concern us in this bulletin; and sleeping sickness is not found in the Philippine Islands.

Recent experiments also seem to indicate that infantile paralysis or anterior poliomyelitis is also carried by flies, the *Stomoxys calcitrans* or stable fly being suspected, while the sand fly has been strongly suspected of carrying pellagra.

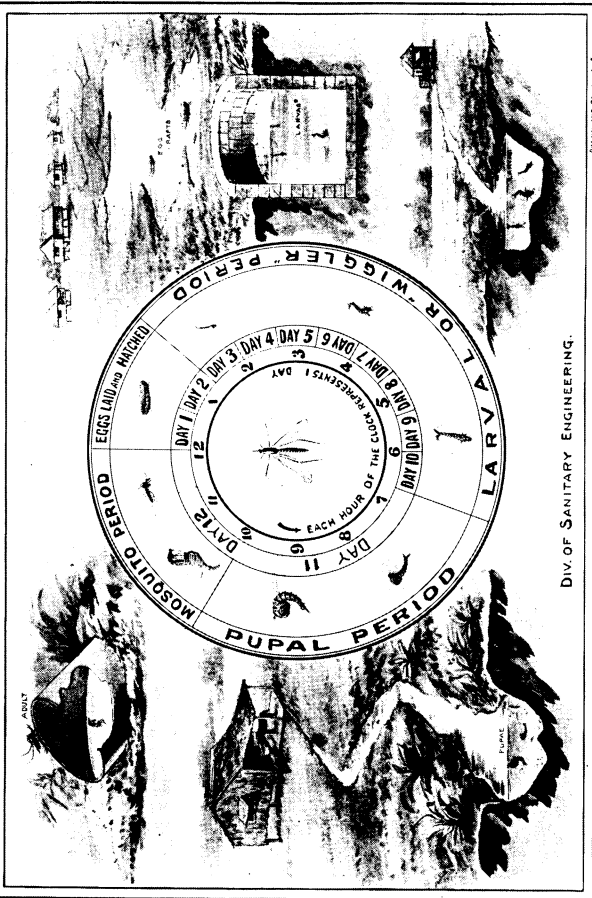
## **Mosquitoes Breed in Stagnant Water**

**THEY  
TRANSMIT**  
**Malaria**  
**Filariasis**  
**Yellow Fever**  
**Dengue Fever**

**Therefore  
oil or destroy  
their breeding  
places**

**Sleep under a  
mosquito bar**

**BUREAU OF HEALTH FOR THE PHILIPPINE ISLANDS**  
**TIME OF DEVELOPMENT OF MOSQUITO**  
 AVERAGE TIME IS ABOUT 12 DAYS.



DIV. OF SANITARY ENGINEERING.



# HOW TO PREVENT MALARIA—NO MOSQUITOES, NO MALARIA.

(PLATE III.)

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**Forms of malaria.**—Malaria appears in many forms, the most common one being chills and fever or *escalofrios*. No matter what form of malaria one may have, it was caused by the bite of a mosquito, as this is the only way that the disease can be carried. One contracts malaria by being bitten by a mosquito that has previously bitten some one who was either suffering from some form of malarial disease or who had malarial germs in his blood.

## THE HABITS OF THE MOSQUITO.

**Habits of mosquitoes.**—Only the female mosquitoes bite and only one kind of mosquitoes, those known as *Anopheles*, carry malaria, but other varieties carry other diseases, so that it is necessary to destroy the breeding places of all kinds of mosquitoes and to treat all as enemies of health.

**Average life of mosquitoes.**—The average life of mosquitoes is about thirty days and they live in the vicinity in which they breed. They do not, as a rule, go far from their breeding place. If they cannot find suitable places to lay their eggs, they will necessarily deposit them in places where they cannot hatch, and inasmuch as the life history of the mosquito is only about a month, the old ones soon become extinct. This makes it *possible* to rid a community entirely of mosquitoes. It is only a question of thoroughness and of vigilance and coöperation on the part of everybody. To destroy all the breeding places of mosquitoes in a given community is to put an end to their race so far as that community is concerned, since they do not live long and their places generally are not taken by others from a distance.

**Where mosquitoes breed.**—Many troublesome mosquitoes breed only in artificial collections of fresh water; that is,

in water in cans, in bottles, in barrels, flower pots and vases, in holes in trees, in pieces of bamboo, and in other receptacles, as well as in crevices and small holes in the ground and in pools of water. Others breed in natural collections of fresh or salt water, as pools, ponds, and marshes, which contain dead organic matter upon which they feed.

**Mosquito eggs and larvae.**—Mosquito eggs can only hatch in water; wrigglers live in water at least seven to twelve days, and though they live in water, they have to come to the surface to breathe the air. This affords the opportunity to smother them, which is done by pouring coal oil on the surface of the water and distributing it uniformly so that it forms a scum or film that prevents them from breathing the air and thus causes their death.

### HOW TO GET RID OF MOSQUITOES.

**Breeding places.**—The most important thing in getting rid of mosquitoes is to destroy their breeding places. Empty the water out of all tubs, buckets, cans, bottles, flower pots, and vases at least once in every forty-eight hours.

**Pools, ditches, and post holes.**—Fill or drain all pools and ditches, and fill in or cover all post holes, crevices, and other places where water stands.

**Chicken coops, kennels, and animal houses.**—Change regularly every day all water needed in chicken coops, dog kennels, and other animal houses, so that the female mosquito will not find a place to lay her eggs.

**Quantity of petroleum to be used.**—Pour petroleum on all standing water that cannot be screened or drained, the amount necessary being about *150 cubic centimeters* of oil to *1 square meter* of surface, taking care to distribute it evenly so that there will be no places free from the oil where the wrigglers can obtain air. The oil remains on the top of the water as a scum and does not affect the water below.

**Cisterns, wells, and tanks.**—Cisterns, wells, and tanks containing drinking water should be protected by wire netting so that mosquito eggs may not be deposited in such places.

**Goldfish and minnows.**—Watering troughs for stock, ponds, fountains, and other places in which it is not desirable to

put oil and which cannot be protected by screens may be kept free from wrigglers by goldfish and minnows.

**Septic tanks and cesspools.**—Septic tanks and cesspools should have their ventilating pipes screened and the liquid contents oiled once a week.

**Weeds, grass, and bushes.**—The weeds, grass, and bushes which grow along the edges of ditches and ponds should be kept cleared away, as they afford a hiding place for mosquitoes.

**Vacant lots.**—Vacant lots and back yards should be kept clean and free from tin cans, bottles, and rubbish.

**Sewer pipes, gutters, and ditches.**—Openings into sewer pipes and the outlets of sewers should be screened, and gutters, culverts, and ditches along the sides of roads, when they cannot be drained, should be treated with petroleum.

**Fumigation.**—Houses that can be closed up may be cleared of mosquitoes by burning one kilo of sulphur to every 30 cubic meters of space. The mosquitoes will fall to the floor and should be collected and burned.

**Dark places.**—A very effective way to destroy mosquitoes is to search for them in the morning, when they will be found hiding in dark corners of the house and in folds of dark clothing, and kill them with a towel or a broom.

**Smudge fires.**—Considerable relief from the mosquito pest may be obtained by building smudge fires under or around your house. The fuel used may be wet rags, waste paper, leaves, or other materials that will cause smoke. It is not necessary to use expensive fuel, for that which does not cost money is just as effective. The object is to get as much smoke as possible.

## **HOW TO PROTECT OURSELVES FROM MOSQUITOES AND MALARIA.**

**How to take quinine as a prophylactic against malaria.**—Since it is a difficult matter to eradicate mosquitoes entirely, if there is any malarial disease in the neighborhood it is well to take prophylactic doses of quinine; that is, from one-third to two-thirds of a gram a day—330 to 660 milligrams, one-half in the morning and one-half at night. Children

between 5 and 12 years of age should take a proportionately smaller amount, say 200 milligrams twice a day, while younger children should be given not more than half of this quantity.

**Notification.**—In all cases of illness from malaria the president of the municipal board of health should be informed. If this cannot be done by the sick person, the *concejal* or *teniente* of the barrio in which the sickness occurred will attend to it.

**How to cure malaria.**—As soon as the first chill makes its appearance the patient should begin to take quinine in quantities from 1 to 3 grams a day, with some laxative medicine to keep the bowels open. Children between 5 and 12 years of age should take from 200 milligrams to half a gram a day, while younger children should take from 65 to 130 milligrams a day. If quinine cannot be administered by the mouth to children it should be made into an ointment and rubbed on the abdomen and chest, and under the arms. Quinine ointment may be made by rubbing up 1 part of quinine with 9 parts of vaseline or lard.

**Protect the sick and the well from mosquitoes by sleeping under a mosquito net.**—All persons known to be sick with malaria should be protected by mosquito nets so that mosquitoes cannot bite them and carry the disease to well persons. When practicable the room should be screened so as to keep mosquitoes out.

While it is very important to protect persons suffering from malaria by mosquito nets and screens, it is equally important that those who are not sick should be so protected. Every bed, *petate*, lounge, or couch upon which persons sleep should be protected by a net for the purpose of preventing mosquito bites and the diseases which they cause.

**Danger of narrow beds.**—If a bed is too narrow so that one has to sleep with his arm or other portion of his body directly against the mosquito net very little protection will be afforded, as mosquitoes can easily bite through the net; or if the net is not well tucked in or if there are holes in it, mosquitoes will get into the net. If mosquitoes are found within the net they should be killed and not merely driven out.

## LICE.

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**Kinds of lice.**—There are three kinds of human lice—body lice, head lice, and pubic lice. Lice are blood-sucking vermin that should be exterminated, as they are associated with filth and may transmit disease.

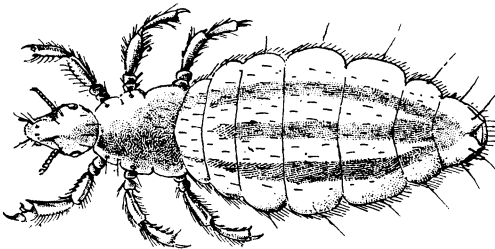
**Breeding places of lice.**—The body louse breeds in the seams of the clothing and carries typhus fever. This louse is not found in the Philippine Islands.

The head louse breeds in the hair of the head, laying its eggs, called nits, and attaching them to the hairs. This is a very common louse in the Philippine Islands and it has been known to carry plague from one person to another and may transmit other diseases.

The pubic louse is also found in the Philippine Islands. It attaches its eggs to the hairs in the pubic region and gives rise to great irritation and itching.

**How to kill lice.**—To kill lice oil the hair thoroughly with a mixture of equal parts of kerosene and coconut oil. This should be put on in the evening and washed off with soap and warm water in the morning. Sulphur ointment is also good to kill lice in the hair. Sulphur ointment may be bought in a drug store or may be made by mixing together 1 part of sulphur to 4 parts of lard or 1 part of sulphur to 4 parts of coconut oil.

Lice may also be effectively killed by washing the hair with tincture of staphisagria or the tincture of larkspur.



HEAD LOUSE.  
(Greatly enlarged.)

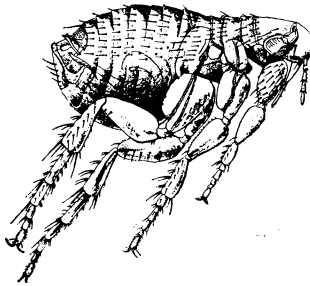
## FLEAS.

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**Habits.**—Fleas suck the blood of warm-blooded animals but do not breed in the hair as do the lice. Fleas lay their eggs on the floors of houses or in the nests of animals and there they develop, first turning into a tiny wormlike creature called the larva, then having a quiet stage called the pupa, and finally turning into the full-grown flea.

**Rats, fleas, and plague.**—The rat fleas are the most dangerous to human beings, because they carry the germ of bubonic plague from rats to man. This then gives us a good reason why we should exterminate rats as well as fleas. **NO RATS—NO RAT FLEAS—NO BUBONIC PLAGUE.** Fleas may also carry other diseases.

**How to kill fleas.**—The human fleas and the dog and cat fleas breed in the dust found on the floors of houses. To kill them, thoroughly spray with petroleum or with a 5 per cent solution of carbolic acid. Petroleum is better.



**INDIAN RAT FLEA.**

**Carries plague from rat to rat and to man.**

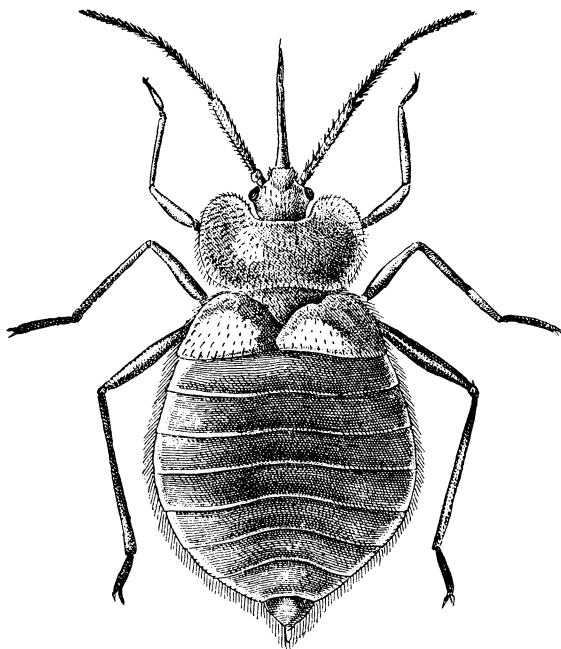
(Greatly enlarged.)

## BEDBUGS.

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**Habits.**—Bedbugs live in the cracks of beds and chairs and also in cracks in the walls and floors of houses. They are very common in the Philippine Islands and are dangerous because they have been known to carry plague and they are believed to be capable of carrying leprosy as well as some other rare diseases. Therefore bedbugs should be exterminated.

**How to kill bedbugs.**—They may be killed by washing the bed with a 5 per cent solution of carbolic acid, or preferably with petroleum, and if found living in the walls of houses the walls should be thoroughly sprayed with petroleum or a 5 per cent solution of carbolic acid, preferably with petroleum.



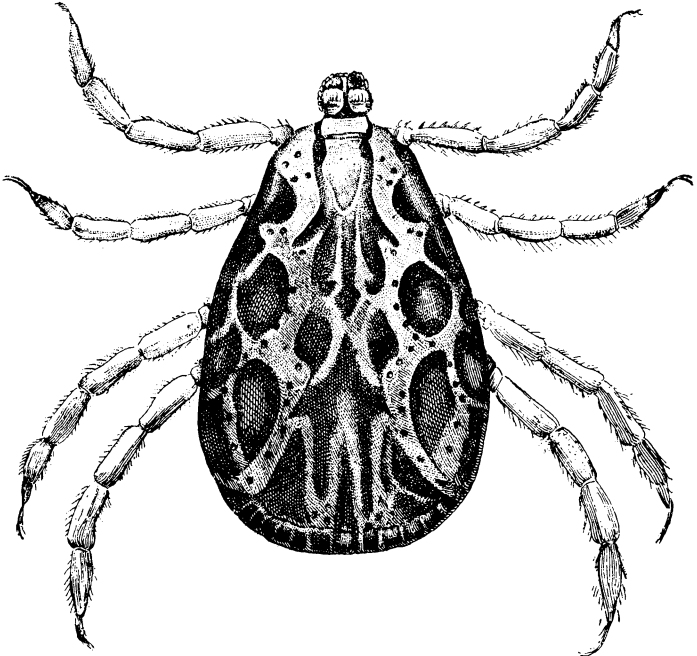
BEDBUG.

(From Bull. No. 5, U. S. Department of Agriculture.)  
(Greatly enlarged.)

## MITES AND TICKS.

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Mites and ticks are not insects but are more closely related to the spiders. A common tick of the Philippine Islands is to be found on dogs. In some parts of the world diseases are found that are transmitted by ticks, such as relapsing fever, which is a disease of man; but this disease is not found in the Philippine Islands. Texas fever of cattle is also carried by a tick. This disease, however, is not known to affect man, so it will not be treated of in this bulletin.



AMERICAN DOG TICK OR WOOD TICK.

(From Bull. No. 5, U. S. Department of Agriculture.)

(Greatly enlarged.)

Mites are closely related to ticks, but the only one of interest in the Philippine Islands is the mite which produces the disease known as scabies or the itch. This is a very common and a very troublesome condition usually affecting children, and it is due to the fact that this tiny mite burrows under the skin to lay its eggs and produces great irritation. It is commonly seen on the hands and feet, especially between the fingers and toes, but may be on other parts of the body.

How to cure scabies.—When a person is suffering from this condition the parts should be thoroughly greased with the sulphur ointment mentioned under treatment of lice, and such treatment should be started early and persisted in or itch is apt to be difficult to cure.







